Pushing the limits

Maths
Ages 11 to 18

Teenagers want to know where the limits are – what they can get away with. Turn that to a mathematical advantage with "possibility spaces". These are tables with different factors running horizontally and vertically, and the task is to see what is allowed and what isn't.

How far can you go before you bump into mathematical limits? For example, make one for different kinds of triangles.

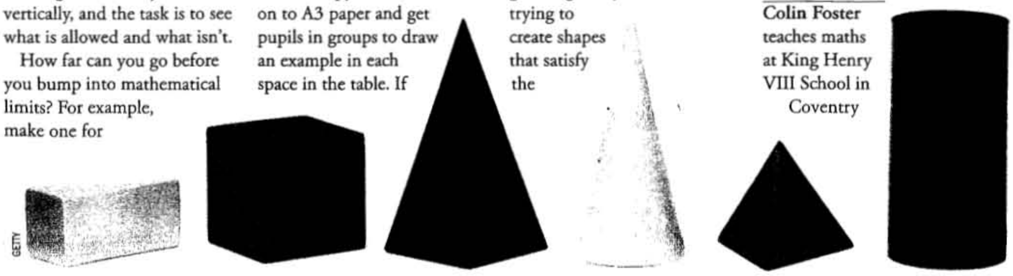
Triangles can be classified according to the lengths of the sides (scalene, isosceles, equilateral) or their angles (acute, obtuse, right angle), but which of the nine boxes in your table are possible and which are impossible?

Photocopy a blank table on to A3 paper and get pupils in groups to draw an example in each space in the table. If some are impossible, pupils must justify why.

One that gets maths teachers thinking, as well as pupils from Year 7 upwards, is a table for order of rotational symmetry and number of lines of symmetry.

Pupils display great ingenuity trying to create shapes that satisfy the constraints or convincing one another that something cannot be done. There are moments when someone finds they can do one that they previously thought was impossible. And the possibility patterns in the finished tables provoke some interesting questions ■

Colin Foster teaches maths at King Henry VIII School in Coventry



Possibility Spaces
Colin Foster

Teenagers want to know where the limits are – what they can get away with. Turn that to mathematical advantage with 'possibility spaces'. These are tables with different factors running horizontally and vertically, and the task is to see what is allowed and what isn't. How far can you go before you bump into mathematical limits?

For example, make one for different kinds of triangles. Triangles can be classified according to the lengths of the sides (the columns) or their angles (the rows), but which of the nine boxes created in the table below are possible and which are impossible? Photocopy the blank table onto A3 paper and get pupils in groups to draw an example in each space in the table. If some are impossible, pupils must justify why.

	scalene	**isosceles**	**equilateral**
acute-angled			
obtuse-angled			
right-angled			

One that gets maths *teachers* thinking, as well as pupils from Year 7 upwards, is one for order of rotational symmetry and number of lines of symmetry:

number of lines of symmetry (l) \ order of rotational symmetry (r)	**1**	**2**	**3**	**4**	**5**	**6**
0						
1						
2						
3						
4						
5						
6						

Pupils display great ingenuity trying to create shapes which satisfy the constraints or trying to convince one another that something can't be done. There are sudden moments when someone finds they can do one which they previously thought was impossible. And the possibility patterns in the finished tables provoke some interesting questions.

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